0120-00-03
1946
C.1

CATION 722
RS' BULLETIN 104

ISSUED AUGUST, 1946
REVISED

DOMINION OF CANADA—DEPARTMENT OF AGRICULTURE

DISCARD

HAYS AND HAY MAKING IN THE PRAIRIE PROVINCES

BY

M. J. TINLINE, B.S.A.

DOMINION EXPERIMENTAL FARM
BRANDON, MANITOBA

EXPERIMENTAL FARMS SERVICE

LIBRARY, ALBERTA AGRICULTURE
7000 - 113 STREET, EDMONTON
ALBERTA, CANADA T6H 5T6

AUG 23 1984

authority of the Hon. JAMES G. GARDINER, Minister of Agriculture,
Ottawa, Canada

10M—9334—8:46

OTTAWA
EDMOND CLOUTIER, B.A., L.Ph., C.M.G.,
KING'S PRINTER AND CONTROLLER OF STATIONERY
1946

AGR. S
133
.P5
#722

HAYS AND HAY MAKING

in the

PRAIRIE PROVINCES

Some thousands of farmers in the drought areas of the Canadian prairies have obtained through the Prairie Farm Rehabilitation Act small quantities of seeds of forage crops, and now there is much interest in hay crops.

Hays have in the past occupied a position secondary to grain on most prairie farms. Yields have been comparatively low and the outlet for hay is restricted to the farm livestock requirements. The usual practice of delaying cutting until the maximum yield is obtainable has resulted in sacrificing quality for yield. Hay crops have been more difficult to establish than grain crops, and there have been many failures, especially in the drier, hotter seasons. Labour requirements to handle the hay crop have been expensive for the reason that the farms have been equipped for the production of cereal crops and there is little specialized machinery for hay. Due to these factors there has not been sufficient hay produced for the needs of livestock. The proportion of the cultivated land in hay and pasture has not been nearly sufficient to provide for the essential fibre replacements in the soil.

Alfalfa grows well on light, sandy soils where the moisture table is a few feet below the soil surface. First cuttings of alfalfa stacked; third growth well advanced. Dominion Reclamation Station, Melita, Manitoba.

There has not been sufficient acreage in grasses and legumes to facilitate the establishing of crop rotations on farms where mixed farming has been undertaken. The lack of well-balanced crop rotations has resulted in farmers finding it necessary to give extensive cultivation to destroy weeds. The stage has now been reached where the fibre in the soil on many farms has been seriously depleted through excessive cultivation. Because of poor hay curing

64268—1½

and storing methods, livestock on a large percentage of farms have not only suffered from an insufficient supply of feed, but the quality of the hay has been so impaired that the animals have not thrived even where there was a reasonable quantity available.

Establishing Stands of Hay

Grasses make up the natural vegetative cover for the prairie soils. This would suggest that there is something wrong with the methods of seeding grasses as commonly practised, since there have been so many failures. At least 25 per cent of the farmers receiving grass and legume seed under the Prairie Farm Rehabilitation Act failed completely to establish a crop.

There have been several reasons for these failures. The seeds of grasses and legumes are small and must necessarily be sown shallower than grain crops. The soil of cultivated land is frequently dry to a depth of at least two inches. Moisture is necessary as well as heat in order to promote germination of the seeds. For this reason cultivated land intended for grass seeding should be more firmly packed than for larger seeds. A second difficulty frequently encountered is too thick a stand of the companion crop of grain, where the grain is used as a so-called "nurse" crop. It will usually be found advisable to reduce the rate of grain seeding to one-half or three-quarters of the normal amount.

District Experiment Substation, Goodlands, Manitoba, showing a plentiful supply of feed in small stacks.

Two other factors responsible in the light soil areas for failures to obtain stands of hay crops are soil drifting and the drying out of young seedlings shortly after they emerge. Under such conditions it may be necessary to resort to sowing late in the fall in clean stubble and keeping the weeds in control by mowing at intervals throughout the following season. This will mean the loss of one year's crop, but under difficult conditions stands once established may

be left for as long as the hay continues to be sufficiently productive. The precautions then in obtaining a stand are:—

1. A supply of weed-free seed of good germination.
2. A soil firmly packed.
3. Sowing not deeper than one to one and a half inches.
4. Seeding grasses late in the fall or very early spring where stands are difficult to obtain.
5. Seeding legumes in early spring.

In some districts marsh hays are extensively fed, the hay being stacked on the marshes in the summer. Since most of the good farming land is some distance from the marshes, time is lost in going in to put up the hay and then later numerous trips are required to move the hay to the farms. Usually these marsh hays are less palatable and nutritious than the cultivated species, because of an admixture of sedges with the grasses. It would seem more profitable to pasture the marsh lands and to grow the hay on the farms in rotation with grain crops.

A method of establishing alfalfa developed at the Dominion Reclamation Station, Melita, consists of sowing grain and legume seed in alternate rows, thus the rows of grain are twelve inches apart and the rows of legume equally spaced. The alfalfa is sown through the grass-seed attachment into the back row of disks or shoes. The pressure is released on these so that the seed is sown quite shallow. The grain is sown through the ordinary grain box and into the front row of disks or shoes, and is sown at the normal depth for grain. To provide fibre, brome grass seed is mixed with the grain. In the second and succeeding years the alfalfa and brome are in alternate rows.

Kinds of Hay

On many farms native hays have completely failed and on others only occasional crops are obtained. Although the kinds of hay crops that can be grown are numerous, only a limited number of them thrive well. There is, however, a reasonable selection so that a variety can be obtained for feeding to livestock. Brome grass and crested wheat grass are the most extensively used grasses. In districts with above-average precipitation meadow fescue will be found useful. Western rye grass, on the other hand, is looked upon with disfavour by entomologists for the reason that it is a host plant for the wheat stem sawfly, an insect that spreads very rapidly once it becomes established. Sweet clover and alfalfa are the two leguminous crops that can be grown. Almost all the cereals make hay, and millets are now grown extensively in the warmer soil areas.

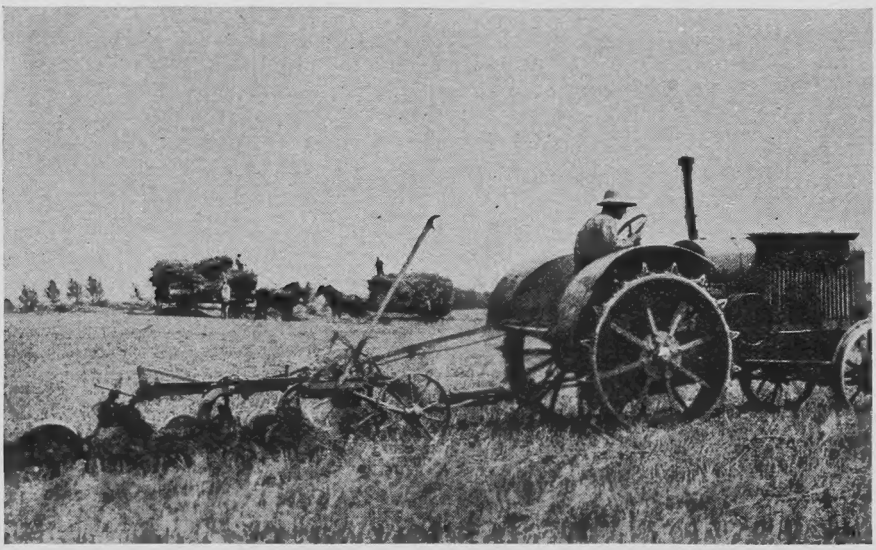
Grasses and Legumes for Hay

Crested wheat grass when sown late in the fall or early in the spring with the precautions previously enumerated, is more easily established than brome grass. On the other hand, brome grass is more likely to be established under summer seeding conditions. Crested wheat grass is the more easily cured, but livestock prefer brome grass hay to that made from crested wheat grass. Sweet clover fits well into the crop rotation systems in use on prairie farms. It can be sown with a nurse crop and the seed is cheap and the hay yields are usually heavy. In addition, the clover has a beneficial effect on the soil.

There is a danger in some seasons that the sweet clover weevil may destroy a part or all of certain fields. As a precautionary measure it is wise to leave a distance of several hundred feet between the old seeding and the new.

Objections have been raised to growing clover on the score that at times it becomes a weed. The use of scarified seed, proper seeding precautions, and the removal of the crop for hay at the proper time, followed by prompt preparation of the land for the succeeding crop, will practically eliminate any danger of sweet clover becoming a weed. Another objection to sweet clover is that under certain conditions it has proved poisonous when fed as hay or silage. Proper curing for hay and observing the necessary precautions in ensiling will

The binder dropping sweet clover into the windrows. A ten-foot dump rake will bunch two windrows at one time, provided not more than a seven-foot swath is cut by the binder.



Small bunches make hand forking onto the load easier. Early ploughing of clover stubble saves moisture for the succeeding crop.

avoid any likelihood of the poisonous properties developing. Sweet clover hay should not be fed exclusively but well-cured hay can safely form a large part of the ration. Sweet clover should be grown much more extensively than it is at the present time.

Alfalfa thrives well on soils where there is a supply of subsoil moisture several feet below the surface. It usually produces two cuttings in a season on the heavier, river bottom lands. It does not do so well except in moist seasons in the drier parts of the prairies. Under such conditions it would seem best to grow the alfalfa in rows and intertill. Two or three thorough cultivations a season will keep weeds in control, provided the cultivations are given early enough to check weed growth. Alfalfa hay is such a valuable feed that it should be on every farm to provide a feed high in protein, minerals, and vitamins for calves, colts, poultry and brood sows.

Mixtures of brome grass and alfalfa are more extensively recommended in the prairie sections of both Canada and the United States than any other combination. Only in recent years has it been recognized that the brome grass grows more vigorously when sown with alfalfa than when sown alone. The brome grass, especially in the older stands, is taller and a deeper green colour when it is a companion crop to alfalfa than where no legume is present.

Cereal Hays

In the past oats have been the most extensively used of all the grain crops for hay. More recently smooth-awned barleys have been used, and wheat to a much lesser extent. While rye has never proved popular, it can be sown in mid-September into reasonably clean stubble and the hay removed in mid-June of the following year, thus providing a hay that can be grown in an emergency on fields where clovers and grasses have failed to become established. In the districts having warm, light soils, and where summer seasons are free from frosts, millet hay can be produced. This crop can be sown late in the spring after other grain crops have started. Under favourable conditions it produces a heavy tonnage, and if the finer strawed varieties, such as Siberian, are used, a fair quality of hay is obtained that can be fed safely to all classes of live-stock except horses. It is unwise to feed millet as an exclusive roughage to horses.

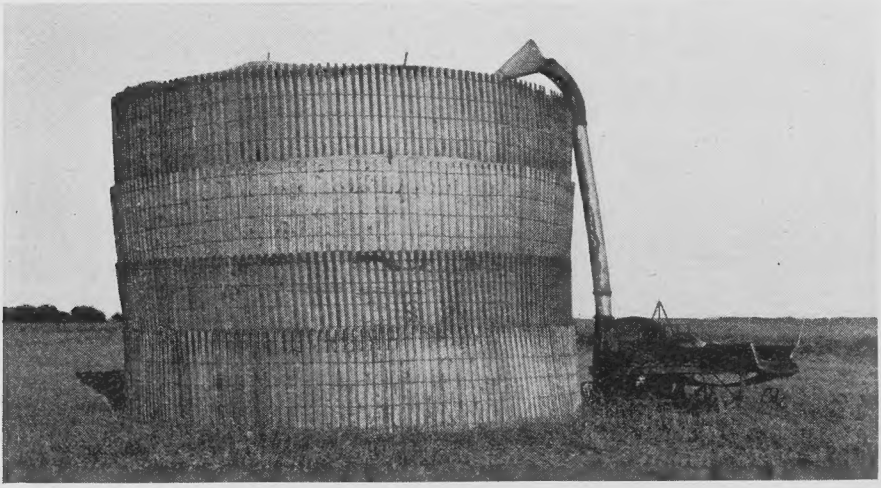
Cutting sweet clover and running loose from the binder on to a six-inch stubble hastens curing, saves leaves and labour.

Improving the Quality of Hay

There is urgent need for improvement in the quality of the hays grown in the prairie section of Canada. Bulk has in the past been the major consideration and relatively little attention has been paid to quality. The cutting of hay is usually delayed to obtain the maximum tonnage, thus the fibre content is increased, digestibility is reduced as well as palatability.

Earlier cutting is the first step in improving quality. Grasses should be cut when in the flowering stage; alfalfa and clover when about one-tenth in bloom. It is a recognized fact that early in the season the fibre content of the hay plants is low and the protein content high. As the season advances the fibre increases while the protein percentage decreases. In one extensive test in Kansas grasses were cut at young, medium, and mature stages of growth. Western wheat grass when cut young contained 14·67 per cent of protein; when cut at the medium stage it contains 7·07 per cent, and when mature the protein

Hay from the eight-year rotation on the Dominion Illustration Station at Gilbert Plains. Alternating hay with grain in a well-planned crop sequence results in more and better feed, less weeds and more soil fibre.



Some 60 tons of green-cut alfalfa and brome grass mixture were cut into this silo in July. A large amount of feed stored into a very small space.

fell to 4·65 per cent. The phosphorus content dropped correspondingly. Malnutrition diseases result when animals are fed for long periods on forages deficient in protein, phosphorus and calcium. Another advantage in earlier cutting is the saving in leaves. The lower leaves frequently dry up if cutting is delayed.

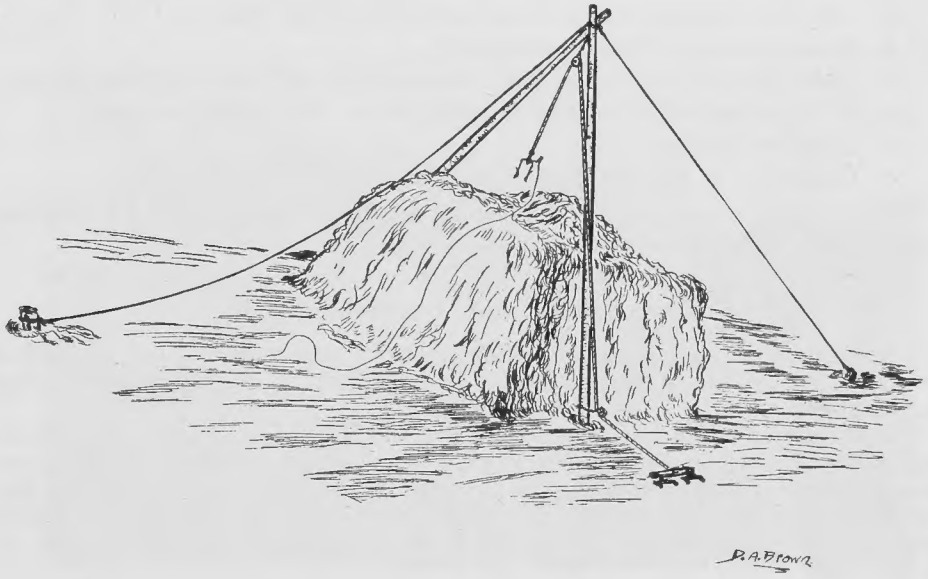
Careful curing of hay is the second step in improving the quality. The bleaching of hay by sun and wind results in a loss of vitamins, and there is a loss of minerals in leaching by rain. Hays spread in the swath may thus quickly lose two important essentials in animal nutrition.

Crops, such as alfalfa and short grasses, must necessarily be cut with the mower, but where either a side delivery rake or green-crop windrower attachment is available the hay can be put into light windrows at an early stage. If the ordinary dump rake is to be used the hay should then be left for a little longer time to dry, but the windrows should be comparatively small. Careful attention to raking at the earliest period possible will effect a saving of leaves, the most valuable part of the hay, and will result in the retaining of more of the valuable food elements.

Sweet clover, cereal hays, tall grass hays and mixtures of brome and alfalfa can be cut with the binder. Where a four-inch stubble can be left, green hay can be cured in the windrow as run out untied from the grain binder. Bleaching is greatly reduced by this method, there being less hay exposed to the sun rays, to the dews or showers. Heavy crops of clover can be cured in this way, and on the fourth day the windrows can be bunched and stacked with normal weather prevailing, or they can be picked up with the hay loader.

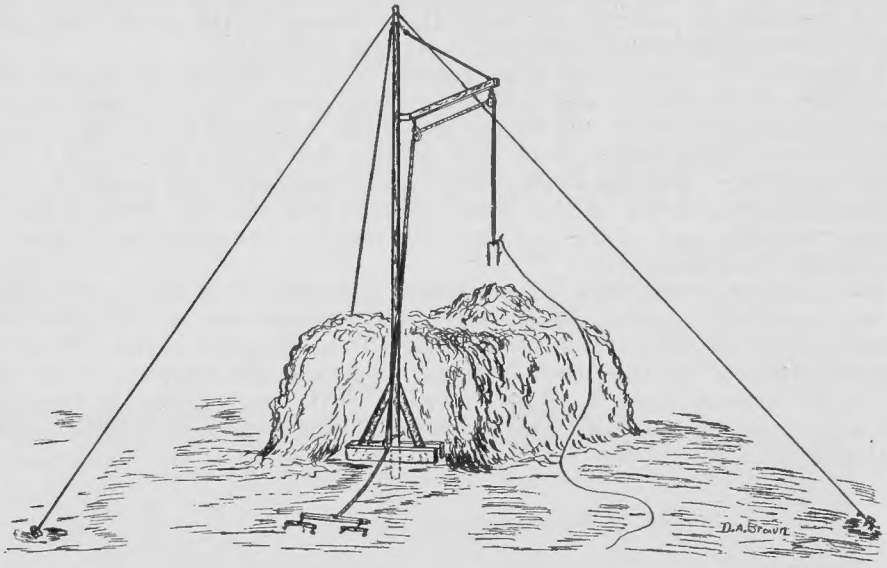
Stacking and Storing

The tonnage of hay lost on the prairie farms by poor stacking and improper storing would feed large numbers of livestock. One of the problems in connection with hay making is the lack of equipment. On some of the large hay marshes and in a few farm districts, haying equipment is available and hand labour is reduced to a minimum. Forking hay by hand, especially from the load to the stack, is not only hard labour but is a long, drawn out, tedious process. Stacking equipment saves labour, speeds up operations, and permits



Two-pole hay stacker. Poles 40 feet long.

taking advantage of favourable weather conditions, thus improving the quality of the hay. Larger stacks can be constructed than is possible when the work is done by hand. The dropping of the hay in the centre of the stack by the stacker makes a solid centre, that results in the construction of a "dry" stack. In large, properly constructed stacks, there is much less wastage of hay and less deterioration in quality.



Single pole hay stacker; swinging boom. Main pole, 40 feet; brace posts (2), 8 feet; base planks (2), 2 in. x 10 in. x 7 feet; boom, 4 x 4 inches x 10 feet.

Types of Stackers

There are various types of stackers in use for lifting hay from the load to the stack and from the ground to the stack. Some of these may be listed as follows:—

1. Two pole stacker, useful in unloading from the wagons.
2. Swinging-boom single pole stacker.
3. Cable stacker—Cable stretched between two tall well anchored poles.
4. Slide stacker—Hay is swept up slide on to stack with buck pole.
5. Overshot stacker.
6. Combination sweep and stacker.

Particulars concerning the commercial types of stackers may be obtained from various farm implement companies.

Horse Sweeps and Overshot Stacker

Stacking with sweeps and overshot stacker is the most popular method of stacking for the reason that the only hand work is the spreading of the hay on the stack.

Both tractor and horse sweeps are used, the former is preferable for sweeping hay long distances and where there is a shortage of labour. Two horse-drawn sweeps will keep two men fully employed on the stack where the hay bunches are reasonably close to the stack. Either a team of horses or a light truck or tractor can be used to furnish power with which to hoist the hay on to the stack.

Plans for home made horse drawn sweep and overshot stacker have been included, since in certain sections of the West native wood can be used extensively in the construction or lumber can be purchased and the equipment can be made in the winter season.

Horse Drawn Hay Sweep

4 *Pieces*—2″ x 4″—12′ for frame.

2 *Corner Braces*—2″ x 3″—5′ attached to the frame at the back, front ends are inserted between the tongues and the frame.

13 *Fingers*—2″ x 4″—8′ tapering to about 2″ square. Each finger is bolted at the back end of the frame and to the 2″ x 4″ set on edge at the front.

1 *Guard Plank*—2″ x 4″—8′ supported by three 2″ x 4″—8″ high. This plank is bolted to main frame by two ⅜″ - 18″ bolts.

2 *Eveners*—and the piece for seat are 2″ x 4″—5′.

2 *Tongues*—4″ x 4″—10′ 6″. These are offset from fingers.

2 *Y Braces*—⅝″ round iron. The two ends extend through the pole. There is a ring at the outer end for the breast strap.

2 *Iron Braces*—⅝″—20″ from the inner end of evener back to the main frame.

2 *Iron Braces*—½″ x 30″ from outer end of evener to back end of pole.

4 *Double Eye Bolts*—½ inch—2 to bolt back end of tongue to frame.
2 for inner end of eveners.

2 *Axles*—1½″ piping or similar material, ends to be bolted to fingers or carried on boxing attached to the 3rd and 4th fingers.

2 *Wheels*—16″ in diameter with 2½″ or more face. Wheels are between 3rd and 4th fingers.

13 *Points*—Cast iron for fingers.

Hand work in handling hay is hard work.

The hayloader hastens loading and increases the size of the load.

The sweeps and the overshot stacker reduce hand work in handling hay to a minimum.

Irrigation of Hay Lands

There are thousands of farms on the prairies where water from the melting snow could be used to irrigate hay lands. The irrigation may consist of impounding water on low lying native or cultivated meadows long enough to saturate the soil. The other plan is to store the water in ponds and irrigate the growing hay crops at convenient times.

On the Brandon Experimental Farm a combination dugout and dam has been in use for several seasons to store water with which to irrigate grass lands. The earth taken from the dugout was used to build up the roadway located on the lower edge of the dugout. Each spring this small project furnishes water enough to irrigate 12 acres of grasses and legumes at least twice. By manuring the meadow with well rotted manure in the autumn and irrigating two or three times in the spring the manure odour was washed away so that the cattle pastured freely. The combination of extra plant food from the manure and moisture from the irrigation greatly increased the feed produced.

This small body of water collected in the combination dugout and dam at Brandon is used to irrigate 12 acres of sod land. The water flows into this pond for a considerable period each Spring.

One system of spreading water. Furrows on the contour are used as laterals on the remainder of this 12-acre field.

Fall application of rotted manure and Spring irrigation has added greatly to the feed produced on this 12-acre field.

Hay Reserves

Periodic years with insufficient fodder in the drier districts of the three Prairie Provinces have resulted in serious financial losses and the depletion of much valuable breeding stock. The obvious remedy for this is to build up reserves of feed. It is a simple matter to keep well-made silage for several years. The lack of storage space for hay on a large percentage of farms presents a problem in saving hay that farmers must solve. Stored in large, well-made stacks, hay can be preserved for a number of years, although some wastage on the top and sides of the stacks must be expected. On the Dominion Experimental Station, Swift Current, hay is baled and kept for a period of years. On the Dominion Reclamation Station, Melita, cut feed has been stored in an enclosure made of old telephone poles and woven wire. These enclosures are about 18 feet wide, 50 feet long and 12 feet high. The cut feed is run directly from the cutting box and well tramped and the stacks topped with long hay. Rain does not penetrate such a stack, and the hay will be available for use in years when the supply is insufficient.

SUMMARY

Hay crops have not received the attention they deserve from prairie farmers.

More hay is needed to provide sufficient feed for the livestock population now on farms and ranches.

Haying practices can be adopted that will improve the quality and feeding value of prairie grown hays and add to the revenue from livestock.

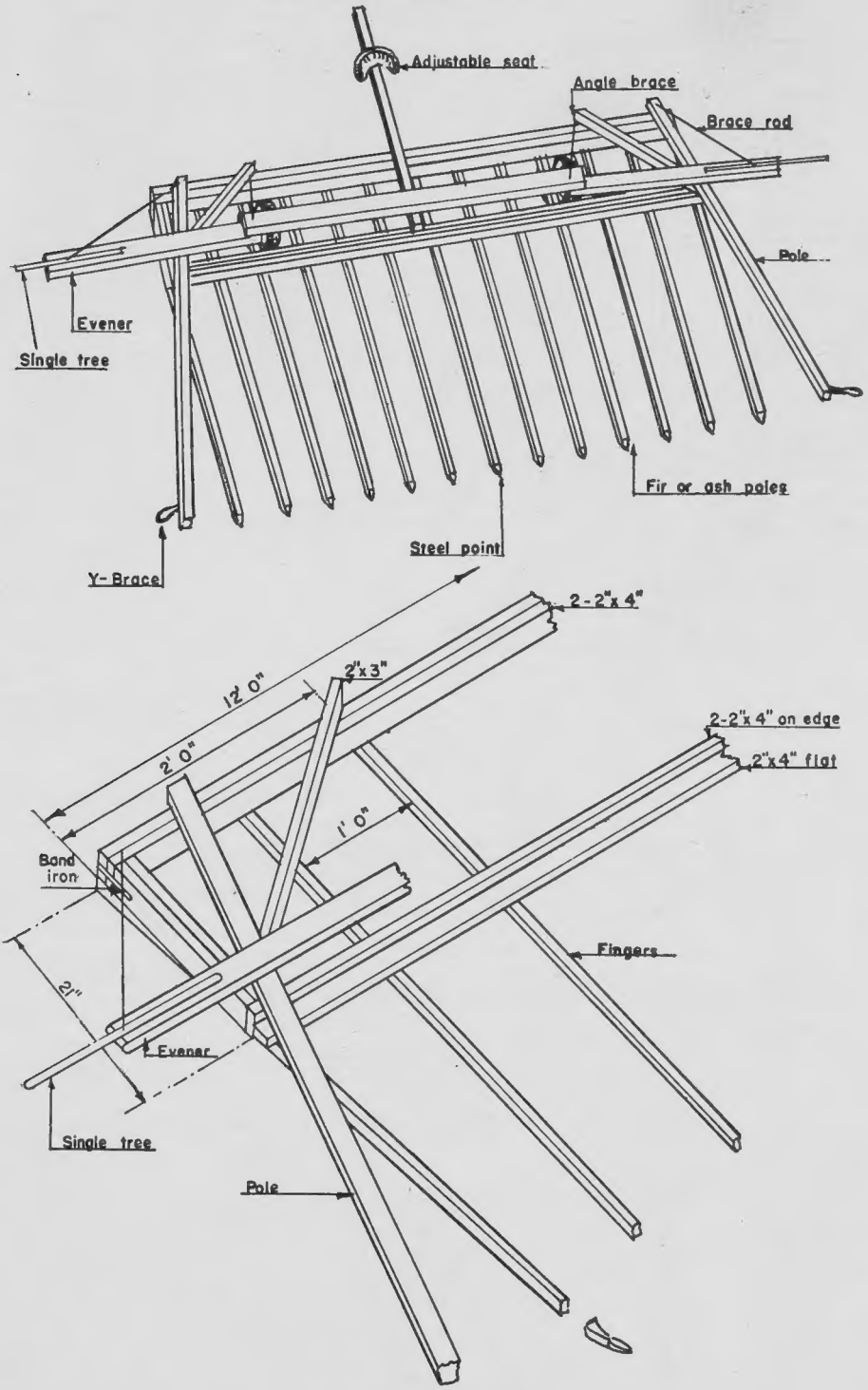
More extensive use of labour saving devices would lower the cost of hay production and at the same time result in the storing of hay of much higher quality.

The rotating of hay with grain in the park belt and in the irrigated areas would improve the physical texture of the soil, increase the resistance of the soil to erosion and reduce the cultivation necessary to keep weeds in control.

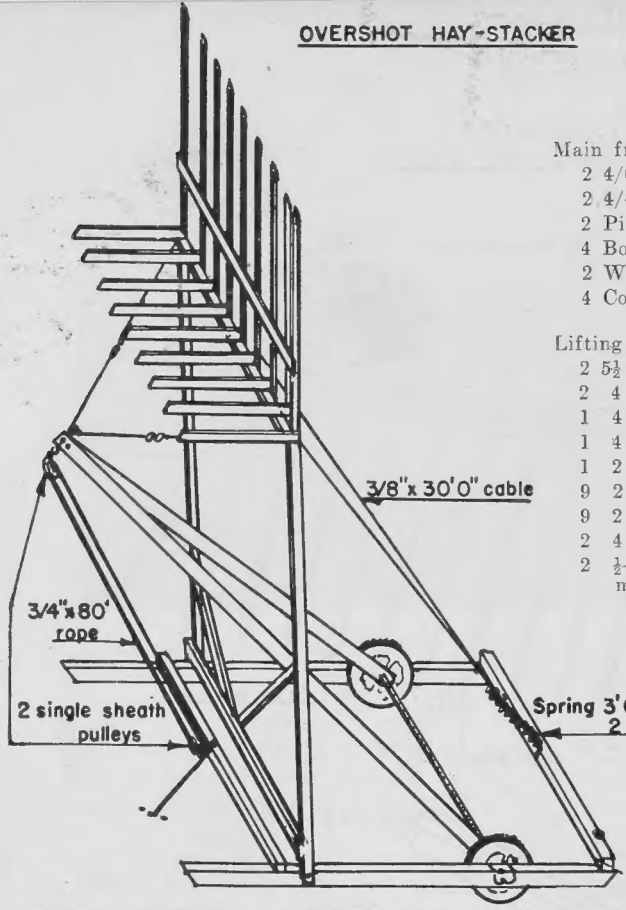
There are many farms on which small irrigation projects could be cheaply installed.

Experience on the Brandon Experimental Farm shows that yields from grasses and legumes can be substantially increased by top dressing with rotted manure in the autumn and irrigating in the spring and early summer.

HOME-MADE HAY SWEEP



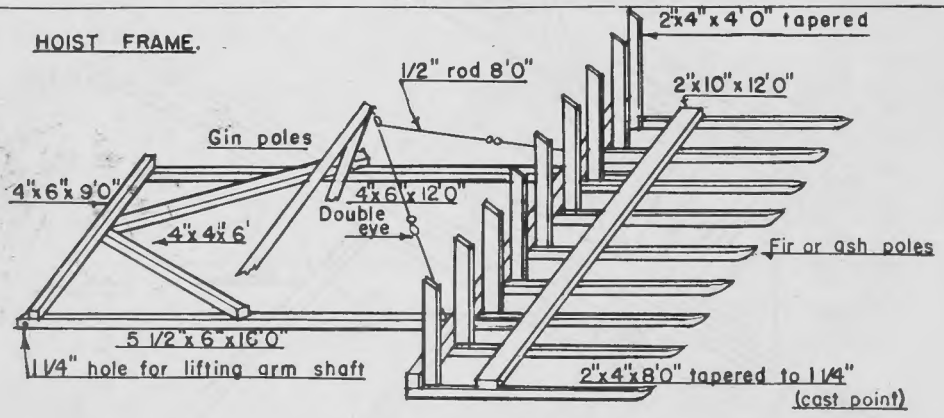
OVERSHOT HAY-STACKER



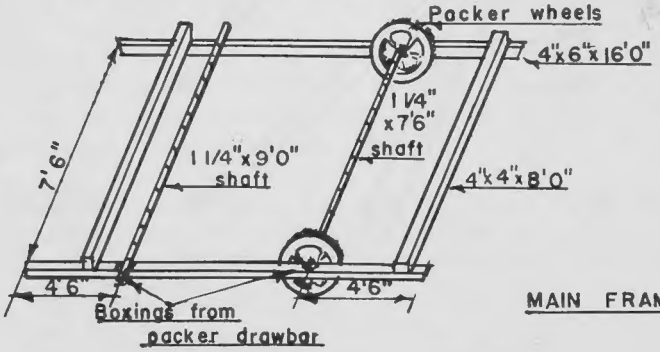
Main frame—Stationary part
- 2 4/6—16′ sills.
- 2 4/4—8′ cross pieces on top of sills.
- 2 Pieces 1¼ inch—8′ steel shafting.
- 4 Boxing 1¼ shafting.
- 2 Wheels (packer wheels satisfactory).
- 4 Collars 1¼″ with set screw.

Lifting arms, rack, gin poles, iron rods, etc.
- 2 5½ x 6″—16′ lifting arms.
- 2 4 x 4″— 6′ bracing.
- 1 4 x 6″—12′ cross member on lifting arms.
- 1 4 x 6″— 9′ cross member on lifting arms.
- 1 2 x 10″—12′ cross member on fingers.
- 9 2 x 4″— 8′ fir or ash poles.
- 9 2 x 4″— 4′ back guards.
- 2 4 x 6″—12′ gin poles.
- 2 ½—8′ iron rods should have double eye midway.
- 1 ⅜—30′ cable.
- 1 2½ to 3″—3′ coil spring.
- 1 ¾″—80′ rope.
- 2 6″ pulleys.
- 9 cast iron points for fingers.

HOIST FRAME.



Lifting arms, rods, rack and gin poles



MAIN FRAME - STATIONARY